THE GENERALIZED GLOBAL-BASIS (GGB) METHOD

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Classical local-basis multigrid have been proven to be ineffective for the solution of indefinite type systems. In this work we present the generalized global-basis method (GGB) to correct and accelerate any existing multigrid/multilevel schemes. Generalized global-basis scheme uses global eigenvectors corresponding to the largest eigenvalues of the multilevel preconditioner as part of the prolongation operator. The idea is to develop a coarse grid correction that accurately approximates modes unresolved by the multigrid/multilevel method of choice. The current method compared to global-basis two-level method is shown to have better convergence rates, but yet possess the same robustness. The asymptotic rate of convergence of the method depends on the multilevel preconditioner used. Numerical examples show that best performance is obtained when using GMRES as an accelerator.